IV B.Tech I Semester

15AEE51-POWER SYSTEM OPERATION AND CONTROL

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Course Objectives:

- *To learn the concepts of unit-commitment and load scheduling.*
- *Hydrothermal system scheduling problems.*
- *To know the single area and two area load frequency control methods.*
- *To learn the economic interchange between interconnected utilities.*
- *To explain the importance of reactive power compensation.*
- *To understand the basics of Restructured Power System.*

UNIT – I ECONOMIC OPERATION OF POWER SYSTEMS

Optimal Operation of Generators in Thermal Power Stations - Heat Rate Curve – Cost Curve – Incremental Fuel and Production Costs, Input-Output Characteristics, Optimum Generation Allocation with Line Losses Neglected. Optimum Generation Allocation including the Effect of Transmission Line Losses – Loss Coefficients, General Transmission Line Loss Formula.

UNIT–II HYDROTHERMAL SCHEDULING, MODELING OF TURBINE & GOVERNOR

Optimal Scheduling of Hydrothermal System: Hydroelectric Power Plant Models, Scheduling Problems-Short Term Hydrothermal Scheduling Problem-Modeling of Turbine: First Order Turbine Model, Block Diagram Representation of Steam Turbines and Approximate Linear Models-Modeling of Governor: Mathematical Modeling of Speed Governing System – Derivation of Small Signal Transfer Function – Block Diagram.

UNIT – III LOAD FREQUENCY CONTROL

Necessity of Keeping Frequency Constant-Definitions of Control Area – Single Area Control – Block Diagram Representation of an Isolated Power System – Steady State Analysis – Dynamic Response – Uncontrolled Case-Load Frequency Control of 2-Area System – Uncontrolled Case and Controlled Case-Tie-Line Bias Control. Proportional Plus Integral Control of Single Area and its Block Diagram Representation-Steady State Response – Load Frequency Control and Economic Dispatch Control.

UNIT – IV REACTIVE POWER CONTROL

Overview of Reactive Power Control – Reactive Power Compensation in Transmission Systems – Advantages and Disadvantages of Different Types of Compensating Equipment for Transmission Systems; Load Compensation – Specifications of Load Compensator, Uncompensated and Compensated Transmission Lines: Shunt and Series Compensation.

UNIT – V POWER SYSTEM RESTRUCTURING

Introduction – Need for Regulation – Motivation for Power System Restructuring – Key Issues in Deregulation. Fundamental concepts of SCADA

V. Sai
BOS - Chairman

Course Outcomes:

The students will have knowledge on the following concepts:

- *Dispatch the load economically among thermal plants.*
- *Unit commitment problems and solution methods.*
- *Short term hydrothermal system scheduling problems.*
- *Model LFC, AGC and AVR for single and two area power systems.*
- *Fundamental concepts of power system restructuring and SCADA*

TEXT BOOKS:

1. Power System Analysis Operation and Control – A. Chakravarthi and S. Halder, 3rd Edition, PHI.
2. Modern Power System Analysis – by I.J.Nagrath&D.P.Kothari Tata M Graw – Hill Publishing Company Ltd, 2nd edition.

REFERENCE BOOKS:

1. An Introduction to: Reactive Power Control and Voltage Stability in Power Transmission Systems by AbhijitChakrabarti, D. P. Kothari, A. K. Mukhopadhyay and Abhinandan De, Eastern Economy Edition, 2010.
2. Power System Analysis and Designby J.Duncan Glover and M.S.Sarma., THOMPSON, 3rd Edition.
3. Electric Power Systems by S. A. Nasar, Schaum's Outline Series, Revised 1st Edition, TMH.

V.Sarma
BOS-chairman